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## INTRODUCTION

Type 1 Diabetes (T1D) is an autoimmune disease characterized by the destruction of pancreatic beta cells. In addition to vascular complications, patients with T1D also suffer risks of additional AIDs that further complicate their care and increase their morbidity<sup>1</sup>. This phenomenon of other autoimmune diseases in T1D has been extensively studied in the pediatric populations<sup>1</sup>, but the literature lacks sufficient epidemiological data about the AID risk in adults with T1D, particularly in older patients, ethnic minorities<sup>2</sup>. Furthermore, the full spectrum of AIDs has not been studied<sup>2</sup>. To better understand the relationship between T1D and associated AIDs, we undertook a population level study from the HealthFacts database and analyzed factors affecting prevalence of additional AIDs.

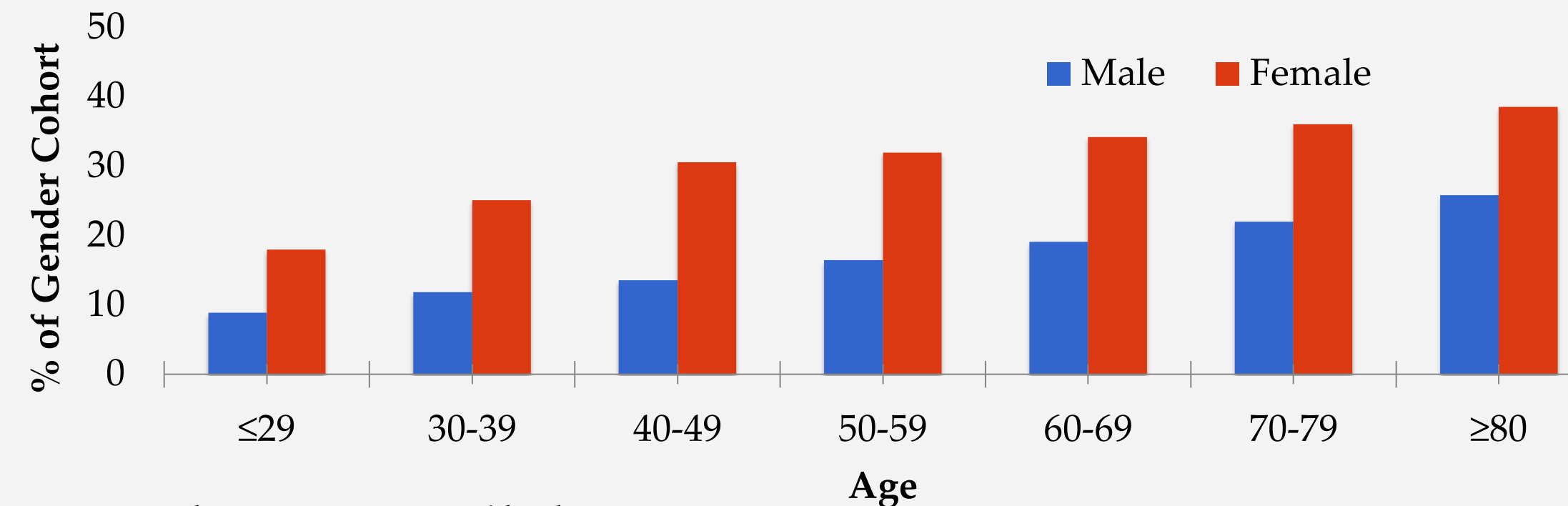
## METHODS

Study population data was gathered from the HealthFacts (Cerner Corporation; Kansas City, MO) database, a national, multi-center, socioeconomically diverse, de-identified patient registry. The ICD-9 codes used to identify T1D were 250.\*1 and 250.\*3. All patients with T2D were removed from the study cohort. The other AIDs were identified using ICD 9 codes.

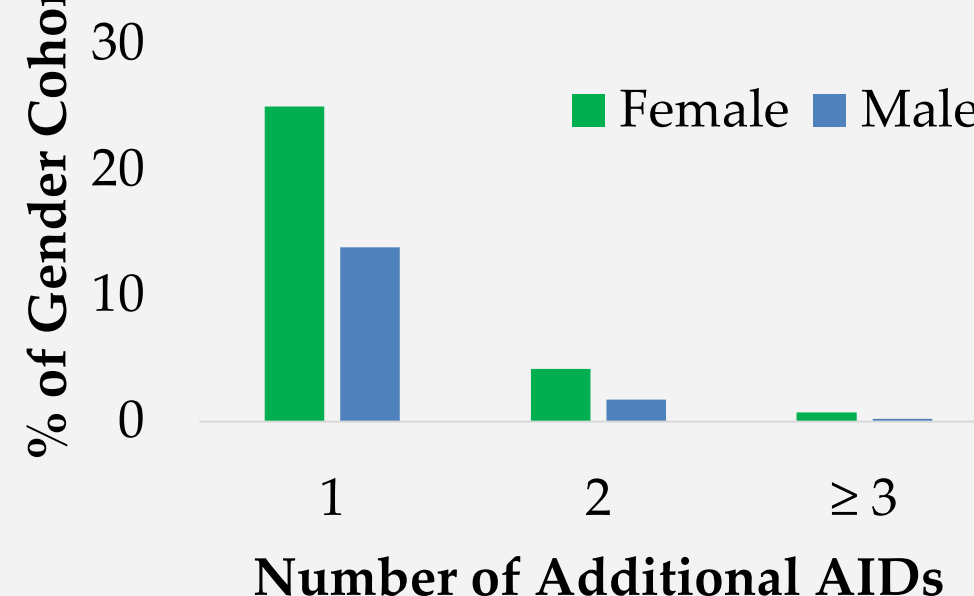
## RESULTS

Autoimmune Disease Frequencies						
Autoimmune Disease	n(%)	Gender		Race/Ethnicity		
		Male	Female	Caucasian	AA	Hispanic
Type 1 Diabetes	158865	75483	83382	107426	31979	3294
Thyroid Disease	31903 (20.1)	9258 (12.2)	20785 (24.9)	23238 (21.6)	3339 (10.4)	462 (14.0)
Hypothyroidism	30298 (19.1)	8710 (11.5)	19814*(23)	22304 (20.7)	2960 (9.2)	420 (12.7)
Hyperthyroidism	3468 (2.2)	1015 (1.3)	2227* (2.7)	2212 (2.0)	699 (2.1)	73 (2.2)
Skin and Hair Disorders	1072 (<1)	254 (<1)	713* (<1)	671 (<1)	200 (<1)	13 (<1)
Collagen Vascular Disease	5537 (3.4)	1484 (1.9)	3494 (4.1)	3518 (3.2)	947 (2.9)	93 (2.8)
Rheumatoid Arthritis	3228 (2.0)	785* (1.0)	2104*(2.5)	2064 (1.9)	566 (1.7)	52 (1.5)
Gastrointestinal AID	2200 (1.4)	842 (1.1)	1166 (1.3)	1563 (1.4)	224 (<1)	21 (<1)
Autoimmune Liver Disease	726 (<1)	288 (<1)	379* (<1)	475 (<1)	128 (<1)	15 (<1)
Addison's Disease	336 (<1)	132 (<1)	199* (<1)	249 (<1)	52 (<1)	6 (<1)
Immune Deficiency	102 (<1)	26 (<1)	57* (<1)	63** (<1)	7 (<1)	1 (<1)
Neurological Disease	1299 (<1)	439 (<1)	794* (<1)	805 (<1)	265 (<1)	22 (<1)

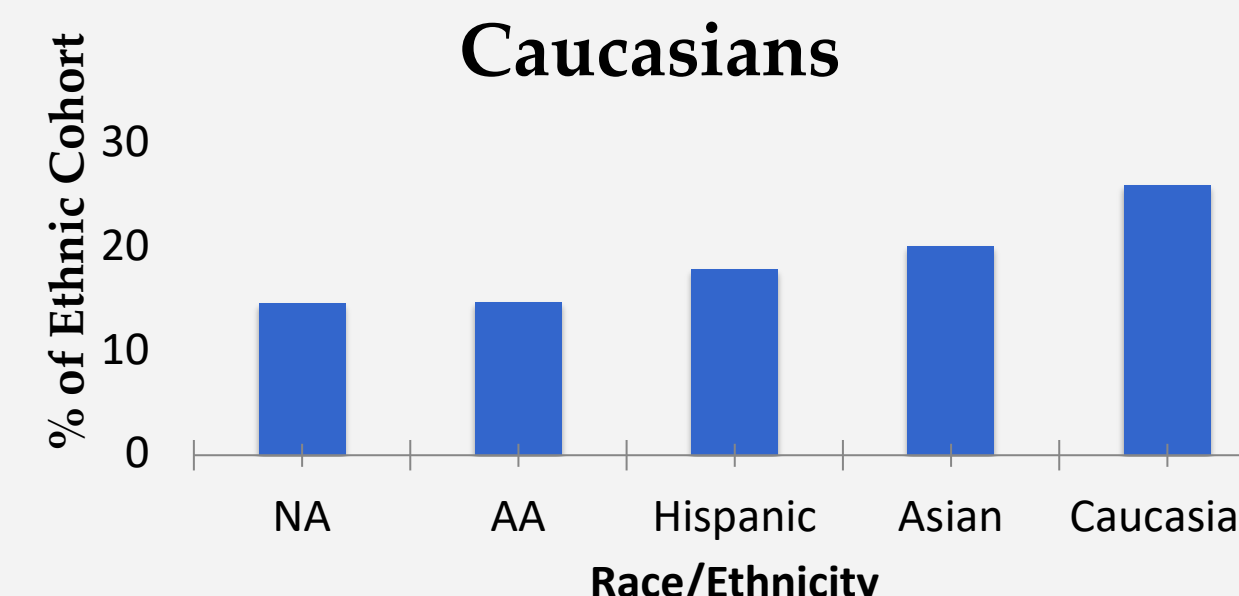
**AID Prevalence Increases with Age and Female Gender**



**Females are More Likely to Have Multiple AIDs**



**AID Prevalence Highest in Caucasians**



	Odds of Additional AID		
	Adjusted OR (95% CI)		p-value
<b>Gender</b>	Male	Ref	
	Female	2.43 (2.37, 2.50)	<0.0001
<b>Race</b>	Caucasian	Ref	
	African American	0.47 (0.45, 0.49)	<0.0001
	Asian	0.68 (0.61, 0.75)	<0.0001
	Hispanic	0.63 (0.57, 0.69)	<0.0001
	Native American	0.49 (0.42, 0.58)	<0.0001
	<b>Age</b>	≤29	Ref
	30-39	1.56 (1.48, 1.65)	<0.0001
	40-49	1.95 (1.86, 2.05)	<0.0001
	50-59	2.22 (2.11, 2.33)	<0.0001
	60-69	2.47 (2.35, 2.59)	<0.0001
	70-79	2.67 (2.54, 2.81)	<0.0001
	≥80	2.81 (2.65, 2.98)	<0.0001

## CONCLUSION

This is the largest cohort to date studying the epidemiology of additional AIDs in patients with T1D. One or more AIDs was incurred in 23.2% of patients, with greater prevalence in females vs males; increasing prevalence with age in both genders. NA, AA, Hispanics, and Asians are at lower risk for additional AIDs than Caucasians. A limitation of this study is under inclusion of additional AIDs because billing data may be incomplete. Future studies would benefit from the study of mechanisms underlying the loss of immune tolerance with age in patients with T1D.

## References

1. Kakleas, K., Soldatou, A., Karachaliou, F., and Karavanaki, K. (2015). Associated autoimmune diseases in children and adolescents with type 1 diabetes mellitus (T1DM). *Autoimmun Rev*14, 781–797.
2. Alves, C., Santos, L.S., and Toralles, M.B.P. (2016). Association of type 1 diabetes mellitus and autoimmune disorders in Brazilian children and adolescents. *Indian J Endocrinol Metab*20, 381–386.